

Claflin University & Orangeburg-Calhoun Technical College
Orangeburg, SC

Principal Investigator: Dr. Nesan Sriskanda

Co-PIs: Drs. Kalapathy, Rizzuti, Cheryl McCreary (OC Tech.) & Mr. Mani

Website URLs: <http://www.claflin.edu/> or www.octech.edu

Project: Integration of NASA related Science, Research and Activities in STEM Curriculum

Claflin University in Orangeburg, South Carolina, has strong commitment and long tradition of providing academic opportunity and preparation for African-Americans. Over the past few years Claflin's enrollment has grown by over 40% to approximately 1,750 students. Over 90% of the student body is African American with a female to male ratio of approximately 60:40. Although we have a diverse student body, the majority of our students are South Carolina natives. *U.S. News and World Report* ranks Claflin number ten in the "Top Ten" and **number one** "Best Value" among best Comprehensive Colleges in the South for students pursuing bachelor's degrees, in its 2008 "*Guidebook to America's Best Colleges and Universities*".

The overall goals of this program are **(1) To increase students' skill sets in analytical reasoning and knowledge acquisition in science, technology, engineering, and mathematics (STEM) related disciplines; (2) To provide opportunities for under-represented STEM students to be exposed to applied experiences in NASA themed mathematics and science; (3) To infuse research and project management skills in the STEM curriculum through the undergraduate research program;**

To accomplish these goals the following specific objectives are proposed:

(1) Curriculum Improvements to strengthen NASA-related Science and Mathematics; For that, we propose to modify the course description or syllabi for five STEM courses [ENGR 102 (Introduction to Engineering), MATH 212 (Linear Algebra), STAT 401 (Data Analysis), CHEM 201 (Analytical Chemistry), and CHEM 200 (Special Topics in Chemistry)] to include one or more of NASA's mission directorates (Aeronautics, Exploration Systems, Science, and Space Operations) and related research activities. At least 10 % of class time will be allocated to NASA-related research activities in those classes.

(2) To increase the number of traditionally under-represented students exposed to NASA related science, mathematics, and engineering research; for that, Collaboration with the authorities in charge of NASA's educational programs at Marshall Space Flight Center, AL, and Kennedy Space Center, FL, will be established for future educational initiatives.

(3) To form a partnership with a two-year institution to develop an experiential enrichment program; for that, a partnership with Orangeburg-Calhoun Technical College, a two-year minority institution in Orangeburg, SC will be arranged so students from OC Tech will be able to do research with project team at Claflin.

The expected long-term outcomes are:

Seventy-five percent of the students in those classes will demonstrate improved skills in analytical reasoning and critical thinking at the end of the courses by earning a passing score and scoring higher on the post-test than the pre-test.

Instructors will incorporate NASA-oriented mathematics, science and research experiences into syllabi for the proposed courses.

Eighty percent of students in the program will demonstrate an increased knowledge and understanding of NASA-related research concepts and skills by integrating these concepts into their final research projects or thesis.

Dissemination efforts and findings will be presented at the professional meetings and in the educational journals are also anticipated.

Grambling State University, Grambling, LA & Southern University at Shreveport, LA

Principal Investigator: Dr. Naidu V. Seetala

Co-Principal Investigators: Dr. Danny Hubbard, Dr. Matthew F. Ware (Grambling)

Dr. Barry Hester and Dr. John I. B. Alak (Southern)

Website URLs: <http://www.gram.edu/> or <http://web.susla.edu/Pages/SUSLAhome.aspx>

Project: Minority Participation for future NASA Workforce: Curriculum Improvement, 2-year to 4-year Colleges Bridge, University-NASA Research Centers Collaboration

1. Curriculum improvement to integrate NASA related research at undergraduate level: Two research based courses in Physics “**Phys. 421/422 - Projects in Physics I & II**” and one Chemistry course “**Chem. 450 – Research/Independent Study**” will be improved by introducing NASA related research projects. The information regarding NASA research activities and modules related to space science will be placed at the Curriculum Resource Center for the use in Fundamentals of Astronomy (Phys. 120), General Physics (Phys. 153/154), and General Chemistry (Chem. 111/112) and given assignments to learn from these modules. GSU’s planetarium will be upgraded with new episodes on NASA space and earth topics and introduce in the planetarium shows, so that it will have an impact on larger audience.
2. Train minority undergraduate students in research at GSU in the areas related to current NASA research interests: Three research advisors have selected research topics related to NASA and the undergraduate research scholars (5) will be trained in NASA related research at GSU. Research seminars will be conducted to review and disseminate the research findings.
3. Establish collaborations between NASA research laboratories and GSU/SUSLA for faculty research enhancement, and obtain summer internships for minority undergraduate research scholars and faculty at the NASA centers as teams of faculty/research scholars, and continue the research projects at GSU/SUSLA during the academic year: Opportunities will be provided to faculty to improve skill in their fields by attending workshops. Visits to NASA research laboratories by faculty during academic year are planned to develop research collaborations with NASA centers. Summer internships for faculty/undergraduate research scholar teams from GSU and SUSLA at the NASA centers are planned to learn the required scientific skills and continue the research projects at GSU/SUSLA during the academic year.
4. Develop a bridge program between SUSLA and GSU in order to attract minority students into STEM fields, initiate interest in scientific research, and retain them in STEM fields to pursue graduate studies or enter NASA related jobs: The SUSLA Co-PIs will organize interaction of SUSLA students with GSU faculty via seminars at SUSLA and visits to GSU research facilities. The planned visits to GSU research laboratories by SUSLA students and hands on experience with laboratory equipment will enhance their interest in higher education and motivate them to continue their studies at GSU. The SUSLA Co-PIs will also arrange meetings between GSU and SUSLA STEM faculty to develop further collaborations. During these faculty meetings, we will learn more about the STEM curricula at SUSLA to develop or improve the STEM curricula at SUSLA so that the SUSLA associate degree graduates will have a smooth and seem less transition to GSU to complete BS degree. We will visit high schools with the undergraduate research scholars to give science demonstrations as a recruitment tool.

Robeson Community College

Lumberton, NC

Principal Investigator: Jennifer Brown

Co-Principal Investigator: David Gavasci

Partner Institutions: University of North Carolina at Pembroke

Public Schools of Robeson County

Website URLs: <http://www.robeson.edu/> or <http://www.uncp.edu/> or
<http://www.robeson.k12.nc.us/robeson/site/default.asp>

Project: Acquiring Interest in Math and Science (AIMS): On Target for a Bright Future

Robeson Community College (RCC), a fully accredited comprehensive, two year public institution, is a member of the NC Community College System and is located in Robeson County, the most ethnically diverse county in the United States. With a student population of 76% minorities of which 42% are Native American, 32% African American, and 3% Hispanic/Other, RCC is a U.S. Dept. of Education designated Minority-Serving Institution and a Native American-serving Nontribal Institution. Enrollment in 2007-2008 reflected more than 3,600 full time degree-seeking students of which about 80% are first generation college students and 75% women. It is from this population that RCC proposes to increase the numbers of NASA-ready underrepresented minority graduates.

The goal of the RCC CIPAIR project is to achieve curriculum reform and enhance educator professional development resulting in a pipeline of well prepared, underrepresented STEM students from middle school through baccalaureate degree who will graduate with a thorough knowledge of and employment readiness for NASA and related industries.

This project will address NASA's Education **Outcome 1: *Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals through a portfolio of investments.*** In the AIMS project, faculty professional development and NASA Center fellowship opportunities, student outreach and instruction, student research and NASA Center internship opportunities, curriculum reform from middle school through baccalaureate programs, and course development will lead to creation of an educational pipeline (particularly for underrepresented populations) for NASA and related industry careers. The project will address **Outcome 2: *Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.*** Educator professional development from middle and high school classroom teachers to baccalaureate institution faculty, curriculum reform at all levels that will be developed by a group of faculty, administrators and students, provision of curricular resources at all educational levels, incorporation of NASA mission activities, research and resources in the classrooms, student academic support and advisement. It will address **Outcome 3: *Build strategic partnerships and linkages between STEM formal and informal education providers that promote STEM literacy and awareness of NASA's mission*** through presenting NASA-specific resources and exhibits for the public planetarium and annual Mid-Atlantic Fly-in and Sport Aviation Convention, in information sessions, events and press releases whenever possible, providing a speaker's bureau comprised of faculty involved in the project, and other community/parent involvement events.

Courses planned for development at RCC include General Physics I and II, Descriptive Astronomy, General Astronomy I and II, and Observational Astronomy. Specific courses that will be enhanced during this project include General Biology I and II, Introduction to Biotechnology, General Chemistry I and II, Mathematical Models, Survey of Math, Precalculus Algebra, Precalculus Trigonometry, and Calculus I and II.

**University of Texas at San Antonio and San Antonio College
San Antonio, TX**

Principal Investigator: Dr. Hatim Sharif

Co-PIs: Drs. Dan Dimitriu (SAC) and Mehdi Shadaram (UTSA)

Website URLs: <http://utsa.edu/> or <http://www.alamo.edu/sac/sacmain/>

Project: Lift-Off: Curriculum Improvement for Enhancing Minority Engineering Education

The University of Texas at San Antonio (UTSA) and San Antonio College (SAC) are partnering to enrich their engineering and earth science curricula with NASA-related technology and research, to give students from both institutions research and education experiences at NASA, and to improve the 2+2 pipeline for engineering students between the community college and the university. By integrating the use of NASA-based material and modeling and visualization tools into engineering and earth science courses and undergraduate research at UTSA and SAC, this project will address two major goals aligned with NASA's educational mission:

Goal 1: *To attract Hispanic and other minority students into scientific and technological careers related to NASA's mission, and retain them through the baccalaureate.*

Goal 2: *To improve the content and delivery of science and engineering education in two minority-serving institutions, the University of Texas at San Antonio and San Antonio College.*

These goals will be achieved through the following proposed objectives and methods of approach: 1) Each summer of the grant, three UTSA/SAC faculty and six students will visit a NASA center to gain experience in research and curriculum improvement aligned with NASA's mission, and NASA scientists and personnel will be invited to address students at UTSA and SAC; 2) Faculty and students will infuse 12 engineering courses at UTSA and six engineering/earth science courses at SAC with NASA-related technology and content; 3) UTSA and SAC will create a new course related to the use of technology in Earth observation for UTSA and SAC students; 4) UTSA and SAC engineering students will participate in summer research and obtain internships at NASA; 5) Forty-five SAC and 45 UTSA students will receive course credit and a research experience during a summer program; and 6) UTSA and SAC students will be involved in mentoring activities targeting pre-engineering students.

Some of the expected outcomes of the project are: By December 31, 2012, 1) A new course entitled Technology and Earth Observation will be added to UTSA's and SAC's course catalogues as a regular course; 2) At least 36 UTSA/SAC students will be enrolled each semester in the new Technology and Earth Observation course; 3) SAC will increase the number of minority students graduating with an Associate's Degree in Engineering by at least 50%; 4) The number of minority Engineering majors at SAC who transfer to Engineering programs at UTSA will increase by at least 50% from 2008; 5) Fifty SAC transfer students will have completed all junior-year requirements toward a bachelor's degree in Engineering or another science career at UTSA; and 6) The number of minority engineering students graduating from UTSA will have increased by 50% from a 2008 calendar year baseline.